

GEOC: Division of Geochemistry

63 - Kinetics and mechanisms of geochemical processes: It's about interfaces and scale

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Abstract: The rates and mechanisms of important geochemical processes, at biogeochemical interfaces, including ion exchange, sorption, and redox can occur over a range of temporal scales. Ex-situ batch and flow techniques offer high elemental sensitivity, but their time resolution is not adequate to capture rapid reaction rates that often comprise a significant portion of many processes such as sorption and oxidation-reduction. Measurement of rapid, initial rates of environmentally important reactions at the mineral/water interface provides chemical kinetics information that is critical in determining reaction mechanisms. Ideally, to confirm reaction mechanisms, one should track reaction rates in real-time, in-situ, and at the molecular scale. In this presentation an overview of the advances in using in-situ molecular scale techniques, coupled with kinetic measurements, will be provided to study important geochemical reactions including sorption/desorption, surface precipitation, and redox of metals and nutrients.